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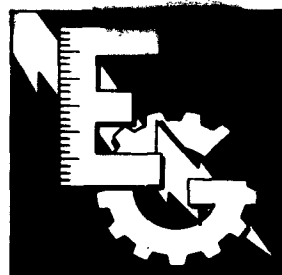
CBR ENGINEERING GROUP REPORT

4-63-3-1
ENGR NO. 55

**U. S. ARMY CBR AGENCY
ENGINEERING DATA
MICRO- REPRODUCTION SYSTEM
PROJECT NO. 61001 PHASE I**

by

John A. Sparks



MARCH 1963

CATALOGED BY ASTIA
AD NO. _____



**U. S. ARMY CBR ENGINEERING GROUP
Army Chemical Center, Maryland**

ENGINEERING GROUP
REPORT


ENGR NO. 55

U. S. Army CBR Agency
Engineering Data Micro-Reproduction System
Project No. 61001
Phase I

by


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U. S. ARMY CHEMICAL-BIOLOGICAL-RADIOLOGICAL
ENGINEERING GROUP

March 1963

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FOREWORD

Purpose

This document was prepared by the U. S. Army CBR Engineering Group, Army Chemical Center, Maryland, as an interim means of providing technical information and guidance concerning the implementation of a U. S. Army CBR Agency Engineering Data Micro-Reproduction System (EDMS).

Scope

The material presented herein is intended for guidance in planning, programming, and supervising the conversion of the present Engineering Data Reproduction System to conform to the Department of Defense Engineering Data Micro-Reproduction System (DOD EDMS).

Authority and Responsibility

The U. S. Army CBR Agency EDMS, for the purposes indicated herein, was approved as a Class "A" project and assigned Microfilming Job No. MD-520 by The Adjutant General on 14 December 1962.

Acknowledgment

The help given by various individuals and organizations contacted during the preparation of this report is gratefully acknowledged.

The Engineering Documentation Branch, Picatinny Arsenal, was especially helpful in providing data from their Engineering Data Micro-Reproduction System.

Coordination

This document was coordinated with the U. S. Army CBR Scientific and Management Services Group, U. S. Army CBR Agency, Army Chemical Center, Maryland.

SUMMARY

This report provides basic technical information compiled during Phase I of the U. S. Army CBR Agency EDMS Project No. 61001.

Section I outlines the purpose, objectives, and advantages and the project schedule of the U. S. Army CBR Agency EDMS.

Section II contains a list of the EDMS equipment required to implement the system and outlines personnel requirements. A comparison is made of the annual operating costs of the EDMS and the present system for reproducing engineering drawings.

Section III describes the basic operating procedure for the Engineering Documentation Branch and outlines the general procedure for Agency-wide EDMS operation.

SECTION I. INTRODUCTION

1. Purpose

The purpose of the U. S. Army CBR Agency EDMS Project is the implementation of a practical, proven system for the efficient maintenance, control, reproduction, and distribution of engineering documentation.

2. Authority

The U. S. Army CBR Agency EDMS Project No. 61001 was granted Project approval by ASA (I&L) on 20 July 1962. The project was approved by The Adjutant General and assigned Microfilming Job No. MD-520 on 14 December 1962.

3. Description of EDMS

The Engineering Data Micro-Reproduction System (EDMS) is a method for reducing engineering drawings and other technical data to 35mm microfilm and mounting the microfilm frames on punched (coded) electrical accounting machine (EAM) aperture cards. Reproduction of drawings from these cards will be accomplished electrostatically or by conventional photographic techniques. The CBR Agency will follow MIL-M-9868, Microfilming of Engineering Documents, 35mm, Requirements for; and MIL-STD-804, Formats and Coding of Tabulating and Aperture Cards for Engineering Data Micro-Reproduction System, exclusively. All engineering documentation will be on DOD Forms 1306 through 1310, which cover drawings, associated lists, revisions, model or type designations, and part and drawing numbers, respectively. These cards will be interfiled, selected, and matched by EAM equipment.

4. Objectives and Advantages

a. Reduced Costs. Considerable engineering time will be saved because a compact system will be provided whereby a film copy of all drawings can be filed in numerical sequence, by end item, part nomenclature, or usage. The necessity for reproduction of full-size prints is reduced, since microfilmed drawings will be viewed on the screen of microfilm readers. Where hand copies of drawings are required, the aperture card will also be used as a master reproducible. The use of reduced-size reference and bid sets of drawings made from the aperture cards will cause savings in paper, increase duplicating speeds, and lower handling costs.

b. Faster Service. This system provides fingertip accessibility to engineering data, substantially decreasing time expended in searching for technical information. The aperture cards will replace whiteprints, Van dykes, and Mylar film reproducibles distributed for Standard-A end

item drawings under the present engineering data system. All activities requiring engineering data support from the CBR Agency as of 31 July 1962 have been contacted. Those U.S. Army CBR Agency activities that are not already equipped to handle microfilmed engineering documents will be provided with their initial requirements for aperture card files, microfilm readers or reader-printers to view the film or make prints according to their needs. They will automatically receive an initial distribution of aperture cards to replace all engineering drawings for end items type classified Standard-A.

c. Elimination of Obsolete Data. Means are available to mechanically search and dispose of obsolete drawings and data, enabling the maintenance of technical information in a current status at all times. This improvement is of major importance when it is considered that at the present time approximately 100,000 engineering drawings are controlled by the U. S. Army CBR Agency and its subordinate elements. The input of new data is resulting in an ever-increasing number of new drawings (par. 7d).

d. Permanent Records. Original tracing files are now in existence for which no duplicate drawings exist. Under the new system, a security (disaster) copy of all U. S. Army CBR Agency-controlled engineering drawings will be filmed and forwarded to the designated Munitions Command repository for inclusion in a master file so that in the event of a disaster, irreplaceable drawings will not be lost. The new system will also eliminate the retirement of full-size drawings to the Army Records Center. Microfilm copies of drawings will be retired thus eliminating large shipping and storage costs.

e. Reduced Floor Space. A reduction in the floor space presently required for the large volume of engineering data will be accomplished. One 10-drawer aperture card file cabinet, occupying 3.8 square feet, will store over 25,000 drawings. Floor space requirements will be reduced from 300 square feet for conventional paper records to 6 square feet for microfilmed records. A large savings in filing equipment will be realized from the system for those activities that do not maintain and store original data.

f. Intangible Benefits. The CBR Agency will be able to participate as an integral part of the DOD EDMS, which will facilitate the exchange of engineering data between the CBR Agency, other Services, and private industries now utilizing the Engineering Data Micro-Reproduction System.

5. Project Schedule

a. Phase I. Determination of the EDMS equipment needed, personnel required to operate the system, and total cost to implement the system.

Phase I has been completed by the EDMS project engineer appointed by the U. S. Army CBR Engineering Group.

b. Phase II. Purchase of needed equipment.

c. Phase III. Installation of EDMS equipment at each U. S. Army CBR Agency activity and conversion of existing engineering documentation files to microfilm. (If personnel are not available within the U. S. Army CBR Agency, it may be necessary to execute a service contract for personnel to convert existing files to microfilm.)

d. Phase IV. Training the personnel at each U. S. Army CBR Agency activity in the use and maintenance of the EDMS equipment.

The U. S. Army CBR Scientific and Management Services Group has been designated by the U. S. Army CBR Agency as the management activity responsible for completion of Phases II, III, and IV. A working group has been appointed to plan, program, and assist in the implementation and supervision of the EDMS. Designated project officers who comprise the task group are:

U. S. Army CBR Scientific and Management Services Group - Lt. Col. Albert Gilbert

U. S. Army CBR Engineering Group - Mr. David Rosenfeld and S/Sgt John A. Sparks

U. S. Army CBR Quality Assurance Group - Mr. Edward M. Jakubowski

U. S. Army Edgewood Arsenal - Mr. Lewis J. Leithauser

U. S. Army Chemical Research and Development Laboratories - Mr. Lawrence Morris, Jr.

SECTION II. COST OF IMPLEMENTING EDMS

6. Total EDMS Equipment Requirements

a. To implement the system Agency-wide, a survey was made of each activity receiving engineering data support from the U. S. Army CBR Engineering Group as of 31 July 1962. The survey was followed by telephone calls and/or visits to each activity by the EDMS Project Engineer to coordinate the implementation of the proposed system. The EDMS equipment will be installed at 19 different activities. To perform their assigned missions, the 19 activities will require a total of approximately 30 complete aperture card decks on end items type classified Standard-A. To implement the U. S. Army CBR Agency EDMS, the following equipment must be purchased, leased, or made available to the activities indicated.

Breakdown by Installation

- (1) Commanding Officer
U. S. Army Rocky Mountain Arsenal
ATTN: Chief, Engineering Division
Denver 30, Colorado
- | | |
|--|-------------------|
| 1 Filmsort "Uniprinter 086" Copier, FSN 6730-823-9718 | \$1,000.00 |
| 2 Model 708-D "Draftsman" Microfilm Reader | 663.10 |
| 1 "Filmac 200" Reader-Printer, FSN 6730-672-8532, cost | 1,176.00 |
| 3 10-Drawer File, TAB Model No. 1574. cost | 552.90 |
| Total | <u>\$3,392.00</u> |
- (2) Commanding Officer
U. S. Army Pine Bluff Arsenal
ATTN: Chief, Chemical Operations Division
Arsenal, Arkansas
- | | |
|--|-------------------|
| 2 Model 708-D "Draftsman" Microfilm Reader | \$ 663.10 |
| 2 "Filmac 200" Reader-Printer, FSN 6730-672-8532, cost | 2,352.00 |
| 4 10-Drawer File, TAB Model No. 1574. cost | 737.20 |
| Total | <u>\$3,752.30</u> |
- (3) Commanding Officer
U. S. Army CBR Engineering Group
ATTN: Chief, Weapons Division
Fort Detrick, Maryland
- | | |
|--|-------------------|
| 1 Model 708-D "Draftsman" Microfilm Reader | \$ 331.55 |
| 1 "Filmac 200" Reader-Printer, FSN 6730-672-8532, cost | 1,176.00 |
| 1 10-Drawer File, TAB Model No. 1574. cost | 184.30 |
| Total | <u>\$1,691.85</u> |

- (4) Commanding Officer
U. S. Army Chemical Center Procurement Agency
Army Chemical Center, Maryland

| | |
|--|-------------------|
| 1 "Filmac 200" Reader-Printer, FSN 6730-672-8532 | \$1,176.00 |
| 2 Model 708-D "Draftsman" Microfilm Reader | 663.10 |
| 1 Horizontal Reference File, TAB Model No. 3651, w/accessories Model No. 3806, 3807, 3861, 3870 | 189.15 |
| Total | <u>\$2,028.25</u> |

- (5) Commanding Officer
U. S. Army CBR Quality Assurance Group
ATTN: SMUQA-ED, Building 11
Army Chemical Center, Maryland

| | |
|--|-------------------|
| 1 Model 708-D "Draftsman" Microfilm Reader | \$ 331.55 |
| 1 "Filmac 200" Reader-Printer, FSN 6730-672-8532, cost | 1,176.00 |
| 1 10-Drawer File, TAB Model No. 1574. cost | 184.30 |
| Total | <u>\$1,691.85</u> |

- (6) Commanding Officer
U. S. Army CBR Quality Assurance Group
ATTN: Chief, Drafting Branch, Building 24
Army Chemical Center, Maryland

| | |
|--|-------------------|
| 1 "Filmac 200" Reader-Printer, FSN 6730-672-8532, cost | \$1,176.00 |
| 1 Model 708-D "Draftsman" Microfilm Reader. cost | 331.55 |
| 2 10-Drawer File, TAB Model No. 1574. cost | 368.60 |
| Total | <u>\$1,876.15</u> |

- (7) Commanding Officer
U. S. Army Edgewood Arsenal
ATTN: Planning Officer, Dir/Mfg., Building 65
Army Chemical Center, Maryland

| | |
|---|-------------------|
| 1 "Filmac 200" Reader-Printer, FSN 6730-672-8532, cost | \$1,176.00 |
| 2 Model 708-D "Draftsman" Microfilm Reader cost | 663.10 |
| 1 Roll Film Attachment for Model 708-D. cost | 18.95 |
| 8 1-Drawer File, TAB Model No. 1502 cost | 88.80 |
| 1 10-Drawer File, TAB Model No. 1574. cost | 184.30 |
| Total | <u>\$2,131.15</u> |

- (8) Commanding Officer
U. S. Army Edgewood Arsenal
ATTN: Chief, Photo-Signal Laboratories, Building 205A
Army Chemical Center, Maryland

| | |
|---|-------------------|
| 1 Single Action Vacuum Frame, 44 x 62 inches, Bruning Number 19-162 | \$1,233.00 |
| 1 Vacuum Pump and Motor Unit for Vacuum Frame, Bruning Number 19-480 | 155.00 |
| Total | <u>\$1,388.00</u> |

- (9) Commanding Officer
U. S. Army Chemical Research & Development Laboratories
ATTN: Chief, Design Concepts Branch, Building 330
Army Chemical Center, Maryland

| | |
|--|-------------------|
| 1 "Filmac 200" Reader-Printer, FSN 6730-672-8532, cost | \$1,176.00 |
| 1 Model 708-D "Draftsman" Microfilm Reader. . . . cost | 331.55 |
| 1 10-Drawer File, TAB Model No. 1574. cost | 184.30 |
| Total | <u>\$1,691.85</u> |

- (10) Commanding Officer
U. S. Army Eastern Chemical Depot
ATTN: Administrative Officer, Building 34A
Army Chemical Center, Maryland

| | |
|--|------------------|
| 1 Model 708-D "Draftsman" Microfilm Reader. . . . cost | \$ 331.55 |
| 1 10-Drawer File, TAB Model No. 1574. cost | 184.30 |
| Total | <u>\$ 515.85</u> |

- (11) Commanding Officer
U. S. Army CBR Engineering Group
ATTN: Chief, Specifications Division, Building 209
Army Chemical Center, Maryland

| | |
|--|------------------|
| 2 Model 708-D "Draftsman" Microfilm Reader. . . . cost | \$ 663.10 |
| 1 10-Drawer File, TAB Model No. 1574. cost | 184.30 |
| Total | <u>\$ 847.40</u> |

- (12) Commanding Officer
U. S. Army CBR Engineering Group
ATTN: Chief, Material Requirements Branch, Building 209
Army Chemical Center, Maryland

| | |
|--|-------------------|
| 1 "Filmac 200" Reader-Printer, FSN 6730-672-8532, cost | \$1,176.00 |
| 1 Model 708-D "Draftsman" Microfilm Reader. . . . cost | 331.55 |
| 1 10-Drawer File, TAB Model No. 1574. cost | 184.30 |
| Total | <u>\$1,691.85</u> |

- (13) Commanding Officer
U. S. Army CBR Engineering Group
ATTN: Chief, Cataloging Division, Building T-1314
Army Chemical Center, Maryland

| | |
|--|-------------------|
| 1 "Filmac 200" Reader-Printer, FSN 6730-672-8532, cost | \$1,176.00 |
| 1 Model 708-D "Draftsman" Microfilm Reader. . . . cost | 331.55 |
| 1 10-Drawer File, TAB Model No. 1574. cost | 184.30 |
| Total | <u>\$1,691.85</u> |

(14) Commanding Officer

U. S. Army CBR Engineering Group

ATTN: Chief, Maintenance Engineering Division, Building 51

Army Chemical Center, Maryland

| | |
|--|-------------------|
| 1 "Filmac 200" Reader-Printer, FSN 6730-672-8532, cost | \$1,176.00 |
| 1 Model 708-D "Draftsman" Microfilm Reader. . . . cost | 331.55 |
| 1 10-Drawer File, TAB Model No. 1574. cost | 184.30 |
| Total | <u>\$1,691.85</u> |

(15) Commanding Officer

U. S. Army CBR Engineering Group

ATTN: Chief, Design Division, Building 250

Army Chemical Center, Maryland

| | |
|--|-------------------|
| 1 Filmac "200-R" Reader-Printer, FSN 6730-823-9718 | \$1,455.00 |
| 1 Filmsort "Uniprinter 086" Copier, FSN 6740-823-969 | 1,000.00 |
| 2 Horizontal Reference Files, TAB Model No. 3652 w/accessories Model No. 3806, 3807, 3861, 3870 | 378.30 |
| 2 Tabtray Cabinets, Model No. 4722, 36 Tabtrays Capacity | 151.00 |
| 72 Tabtrays w/follow Block, Model No. 4706 | 315.40 |
| 72 Tabtrays Covers, Model No. 4798 | 122.20 |
| 1 Tabtray Truck, Model No. 4752 | 87.00 |
| 1 Tabtray Rack, Model No. 4757 | 20.90 |
| 1 20-Drawer File, TAB Model No. 1564 | 312.10 |
| 1 10-Drawer File, TAB Model No. 1574 | 184.30 |
| 1 File Dolly, TAB Model No. 1535, for 20-Drawer File | 31.60 |
| 2 Model 708-D "Draftsman" Microfilm Readers | 663.10 |
| 6 Filmsort "Inspector 50", 10 x magnification | 770.40 |
| 4 1-Drawer Files, TAB Model No. 1502 | 44.40 |
| 3 2-Drawer Files, TAB Model No. 1512 | 64.95 |
| Total | <u>\$5,600.65</u> |

(16) Commanding Officer

U. S. Army CBR Engineering Group

ATTN: Chief, CBR Defense Division, Building 250

Army Chemical Center, Maryland

| | |
|--|-----------------|
| 3 Model 708-D "Draftsman" Microfilm Readers cost | \$ 994.65 |
| 3 2-Drawer Files, TAB Model No. 1512. cost | 64.95 |
| Total | <u>1,059.60</u> |

(17) Commanding Officer

U. S. Army CBR Engineering Group

ATTN: Chief, Weapons Division, Building 250

Army Chemical Center, Maryland

| | |
|--|--------------------|
| 3 Model 708-D "Draftsman" Microfilm Readers cost | \$ 994.65 |
| 3 2-Drawer Files, TAB Model No. 1512. cost | 64.95 |
| Total | <u>\$ 1,059.60</u> |

(18) Commanding Officer

U. S. Army CBR Engineering Group
ATTN: Chief, Plants & Processes Division, Building 250
Army Chemical Center, Maryland

| | |
|--|------------------|
| 1 Model 708-D "Draftsman" Microfilm Reader. . . . cost | \$ 331.55 |
| 3 2-Drawer File, TAB Model No. 1512 cost | 64.95 |
| Total | <u>\$ 396.50</u> |

(19) Commanding Officer

U. S. Army CBR Scientific and Management Services Group
ATTN: EDMS Project Officer
Army Chemical Center, Maryland

| <u>Microfilm Camera and Accessories</u> | <u>Product No.</u> | <u>Cost</u> |
|---|--------------------|-------------------|
| Recordak Micro-File Machine, Model MRC-4 | 6751 | \$4,658.00 |
| Microdealers, Metron Automatic Light Control, | | |
| Item 21-1 | | 1,420.25 |
| Sub-Surface Illuminator WLA-1 | 6024 | 783.25 |
| Electrical Outlet Kit | 8766 | 14.50 |
| Multiple Frame Control Unit, WA4C | 8756 | 258.25 |
| 16:1 Reference Target | 8758 | 30.75 |
| 20:1 Reference Target | 8759 | 30.75 |
| 24:1 Reference Target | 8760 | 30.75 |
| 30:1 Reference Target | 8761 | 35.00 |
| Drawing Positioning Kit | 8769 | 65.00 |
| Light Shield Kit | 8777 | 100.75 |
| Machine Base Extension Legs (fine) | 8778 | 39.40 |
| Right-Hand Work Table | 8779 | 74.50 |
| Left-Hand Work Table | 8780 | 74.50 |
| N.B.S. Resolution Test Charts | 8781 | 1.31 |
| Frame Numbering Kit | 8785 | 13.20 |
| Automatic Reduction Selector Kit | 8789 | 481.25 |
| Black Background for MRC-4 | 8795 | 56.90 |
| Paper Weight Bars | 8796 | 13.20 |
| Sub-Total | | <u>\$8,181.51</u> |

Microfilm Processor and Accessories

| | |
|--|-------------------|
| Recordak Film Processor, Model K-136, Product No. 7525 | \$2,915.00 |
| Circulation and Temperature Control System, | |
| Product No. 7539 | 671.30 |
| Replenisher System, Product No. 7538 | 475.30 |
| Replenisher Tanks and Tubing, approximate cost | 188.40 |
| Sub-Total | <u>\$4,250.00</u> |

Microfilm Inspection Equipment

| | |
|---|-------------------|
| 1 GRISWOLD MICROFILM SPLICER, Model DUPLEX | 48.51 |
| 1 Densitometer, "Densichron", Bruning No. 14-147 | 495.00 |
| 1 Microscope, 50X Magnification, Bruning No. 14-148 | 141.50 |
| 1 Case, Microscope, Bruning No. 141-150 | 31.85 |
| 1 Recordak Film Reader, Model MPE-1, Product No. 6505 | 481.00 |
| 1 Foot Treadle Advance, MPE Reader, Product No. 8152 | 83.25 |
| 1 Aperture Card Adaptor, MPE Reader, Product No. 8923 | 43.75 |
| 2 Film Rewinds, Microdealers Model RW-I-MF, Pairs | 47.04 |
| 1 Hand Punch, 1/4 inch diameter | 5.00(est) |
| 1 Model 708-D "Draftsman" Microfilm Reader | 331.55 |
| 1 Roll Film Attachment for Model 708-D | 18.95 |
| 1 "Filmac 200-R" Reader-Printer, FSN 6730-823-9718 | 1,455.30 |
| Sub-Total | <u>\$3,182.70</u> |

Microfilm Mounting and Reproduction Equipment

| | |
|--|-------------------|
| 1 Semi-Automatic Mountor, Filmsort, FSN 6760-564-4018 | \$3,990.00 |
| 1 Hand Mounter, Filmsort, FSN 6760-564-4002 | 553.00 |
| 2 Filmsort "Uniprinter 086" Copiers, FSN 6740-823-9692 | 2,000.00 |
| Sub-Total | <u>\$6,543.00</u> |

Microfilm File Equipment and Accessories

| | |
|---|-------------------|
| 2 Tabtray Cabinets, Model No. 4722, 36 Tabtray Capacity | \$ 151.00 |
| 72 Tabtrays w/follow Black, Model No. 4706 | 315.40 |
| 72 Tabtray Covers, Model No. 4798 | 122.20 |
| 1 Tabtray Truck, Model No. 4752 | 87.00 |
| 1 Tabtray Rack, Model No. 4757 | 20.90 |
| 2 Horizontal Reference Files, TAB Model No. 3652, w/accessories Model No. 3806, 3807, 3861, 3870 | 378.30 |
| 1 20-Drawer File, TAB Model No. 1564 | 312.10 |
| 1 File Dolly, TAB Model No. 1535, for 20-Drawer File | 31.60 |
| 1 10-Drawer File, TAB Model No. 1574 | 184.30 |
| Sub-Total | <u>\$1,602.80</u> |

TOTAL \$23,760.01

Total EDMS Equipment for all Installations \$57,958.56

Data Processing Equipment (To Be Rented)

Approx Rental

| | |
|--|-----------------------|
| 2 IBM Type 026 Card Punch Machines @ \$90.00/mo. | \$ 180.00 |
| 2 IBM Type 056 Verifiers @ \$90.00/mo. | 180.00 |
| 1 IBM Type 519 Reproducer @ \$128.00/mo. | 128.00 |
| 1 IBM Type 557 Interpreter @ \$203.00/mo. | 203.00 |
| 1 IBM Type 082 Sorter @ \$112.00/mo. | 112.00 |
| 1 IBM Type 087 Collator @ \$334.00/mo. | 334.00 |
| Total | <u>\$1,137.00/mo.</u> |

Reproduction Equipment (To Be Rented)

Approx Rental

1 Xerox 1824 Printer, GSA Catalog No. 51-127, Lease
@ \$205.00/mo. for first 2,000 copies and \$.02 for
each additional copy \$ 450.00/mo.

b. Discussions with the Chief, Edgewood Arsenal Data Processing Center, were held in reference to the IBM equipment needed to support the EDMS. The IBM equipment listed for rental must be modified to process microfilm aperture cards and cannot be used for other data processing functions. IBM Type 407 accounting machines, which are available in the Data Processing Center, will be used to make data listings from the master slave decks.

7. EDMS Personnel Requirements

a. Data were obtained from the Engineering Documentation Branch, Picatinny Arsenal, for use in determining personnel requirements. (See Inclosures 1 and 2.) The implementation of a U. S. Army CBR Agency EDMS will require a CBR Agency Engineering Documentation Branch to convert the Agency-wide engineering data to microfilm aperture cards. The recommended organization chart for this Branch is shown in Exhibit II.

b. The following data were used to compute the personnel requirements. The requirements are based upon microfilming 114 documents per roll of film at 5 shots each for a total of 570 frames. Five diazo aperture cards will be required for each master aperture card on Standard-A end items. The microfilm camera as listed in the EDMS equipment will photograph approximately 5 rolls per day for a total output of 570 documents at 1 document per frame.

(1) Preparing and Logging Documents - (Clerk, GS-3)

570 documents/19 documents per hour = 30 hours or 4 clerks

(2) Microfilming (Microphotographer, W-6) (See Inclosure 4)

5 rolls x 1-1/2 hr per roll = 7-1/2 hours or 1
Microphotographer

(3) Film Processing - (Microphotographer, W-6)

5 rolls x 1 hr per roll = 5 hours

(4) Film Inspection - (Microphotographer, W-6)

5 rolls x 1 hr per roll = 5 hours

(5) Film Mounting - (Microphotographer, W-6)

5 rolls x 2 hr per roll = 10 hours

*(6) Diazo Card Printing - (Microphotographer, W-6)

14,250/100 per hr = 142.5 hours (Required to keep diazo decks current with daily maximum camera operation.)

*(7) Diazo Card Inspection - (Microphotographer, W-6)

Every third card is inspected
14,250/400 per hr = 35.5 hours

(8) Card Punching - (Card Punch Operator, GS-3) (See Inclosure 5)

570 cards/28.5 cards per hr = 20 hours

(9) Card Verifying - (Card Punch Operator, GS-3)

570 cards/36 cards per hr = 16 hours

(10) Card Processing - (Tab Operator, GS-4)

5 rolls x 1/2 hr per roll = 2-1/2 hours
14,250 diazo cards/400 cards per hr = 35.5 hours

(11) One Input Supervisor, GS-5

(12) One Microphotography Supervisor, S-2

(13) One EAM Supervisor, GS-9

(14) One Engineering Documentation Branch Supervisor

*NOTE: Operations listed in (6) and (7) may be completed over a longer period of time than the other operations. The most urgent operations are those needed to create the master aperture cards. This work could be done by using the following number of personnel:

One Engineering Documentation Branch Supervisor

One Input Supervisor, GS-5
Four Clerks, GS-3

One Microphotography Supervisor, S-2
Five Microphotographers, W-6

One EAM Supervisor, GS-9
Four Card Punch Operators, GS-3
Two Tab Operators, GS-4

c. A total of 19 personnel would be able to process approximately 570 documents per day for an output of about 2,850 master aperture cards and 2,000 diazo aperture cards. It would require about 1 year to convert the files of existing documents to microfilm by operating with the above number of personnel. It would take an additional year to complete the 625,000 diazo aperture cards needed for reference files on end items that are type classified Standard-A.

d. The U. S. Army CBR Engineering Group is presently creating about 2,000 new drawings and 3,000 revised drawings annually. Other U. S. Army CBR Agency activities will probably create an additional 15,000 documents annually for a total of 20,000 documents per year. At 30 aperture cards per document for those from the U. S. Army CBR Engineering Group and 5 aperture cards per document minimum for those from other CBR Agency activities, the minimum annual requirement is approximately 225,000 aperture cards. This does not include the other technical data needed for procurement, which should also be converted to microfilm in order to provide more efficient service and reduce procurement lead time.

e. The EDMS should reduce the workload of maintaining engineering documentation files at the user activities, since existing files will be reduced to about five per cent of their present volume when the conversion is complete.

8. Volume of U. S. Army CBR Agency Drawings

a. Surveys have determined that the following engineering drawings are controlled within U. S. Army CBR Agency organizations.

| <u>Organization</u> | <u>Number of Drawings</u> |
|---|---------------------------|
| (1) U. S. Army CBR Engineering Group | 50,000 |
| (2) U. S. Army CBR Quality Assurance Group | 14,500 |
| (3) Directorate for Manufacturing, U. S. Army Edgewood Arsenal | 10,000 |
| (4) U. S. Army Pine Bluff Arsenal | 18,750 |
| (5) U. S. Army Rocky Mountain Arsenal | <u>9,750</u> |
| Total drawings | 103,000 |

b. In addition there are approximately 1,557 specifications and standards with an average of 6 pages per document controlled by the U. S. Army CBR Engineering Group. The present trend is that all data included in technical data packages for procurement will be reproduced from microfilm data on file at the responsible agency.

9. Comparison of EDMS Costs With Present Reproduction System Costs

a. The comparison of operating costs is based on data prepared by Engineering Group for the present reproduction system (Exhibit I) and Picatinny Arsenal (Inclosures 1 and 2) for the EDMS. Present operating costs for reproduction of engineering drawings are estimated as follows:

| | | |
|----------------------------------|-------------------------|--------------------|
| Whiteprints (Engineering Group) | 239,200/yr @ \$8.80/100 | = \$21,049.60 |
| Sepia prints (Engineering Group) | 52,000/yr @ \$21.00/100 | = 10,920.00 |
| Film copies (Engineering Group) | 20,000/yr @ \$89.65/100 | = 18,647.00 |
| Whiteprints (USACPD,NY) | 500,000/yr @ \$8.80/100 | = <u>44,000.00</u> |
| Total | | = \$94,616.00 |

Estimated operating costs for the EDMS to support the same functions are:

| | | |
|----------------------------------|-------------------------|--------------------|
| Master aperture cards (5 decks), | 52,000/yr @ \$16.10/100 | = \$ 8,372.00 |
| Diazo aperture cards (23 decks), | 230,000/yr @ \$8.30/100 | = 19,090.00 |
| Whiteprints (total), | 520,000/yr @ \$7.20/100 | = <u>37,440.00</u> |
| Total | | = \$64,902.00 |

b. Assuming the EDMS will also effect a reduction in operating costs for Pine Bluff Arsenal, Rocky Mountain Arsenal, Fort Detrick, and other Agency activities, the annual savings from the EDMS should exceed \$30,000 on an Agency-wide basis.

c. This cost comparison does not include the costs of reproducing the other data included in technical data packages for procurement. The Department of Defense is encouraging the use of microfilm for all engineering documents such as specifications, drawings, sketches, lists, standards, or other information prepared by a design activity and relating to the design, procurement, manufacture, test, or inspection of items or services.

d. The EDMS equipment will cost approximately \$60,000 for purchased items. The rental of EAM equipment and one Xerox 1824 Printer will cost approximately \$20,000 per year. The annual material costs will be dependent on the volume and type of data being processed. (Inclosures 1, 2, and 3.)

e. The proposed Engineering Documentation Branch will require approximately 19 persons during the conversion of existing engineering data to microfilm. The conversion process should be correlated with the CBR Agency schedule for up-dating technical data for procurement, which will enable the EDMS to be of immediate benefit. There will be no reduction in present personnel requirements during the 2-3 year conversion period. The personnel required after the conversion of existing engineering data will be dependent on the reproduction volume at that

time. The reproduction volume of engineering drawings has increased in the CBR Engineering Group from 157,000 in FY60 to an estimated 312,000 for FY63. The volume of prints required by U. S. Army Chemical Procurement District, New York, has increased from 150,000 in FY60 to an estimated 500,000 for FY63.

SECTION III. OPERATION OF EDMS

10. Operation of Engineering Documentation Branch

a. Exhibit II illustrates the recommended organization chart for the Engineering Documentation Branch.

b. Exhibit III illustrates the basic procedure for the Engineering Documentation Branch workflow.

c. The following documents are to be followed insofar as applicable.

- (1) Paragraph 30a, AR 345-218.
- (2) Paragraph 29b(2), AR 345-218.
- (3) Paragraph 31, AR 345-218.
- (4) Paragraph 29, TM 12-257.
- (5) AR 380-5.
- (6) AR 380-44.
- (7) MIL-M-9868A.
- (8) MIL-C-9877A.
- (9) MIL-C-9878A.
- (10) MIL-C-9949.
- (11) MIL-STD-804.

d. As soon as possible after the start of this project and prior to mounting in aperture cards, a sample reel of microfilm will be submitted to The Adjutant General, ATTN: AGAR, in accordance with paragraph 31, AR 345-218. Subsequent samples of exposed film strips, measuring at least 8 inches, taken from the microfilm produced on this project will be forwarded for residual hypo testing at the rate of one exposed film strip from every two-hundredth roll of film produced on the project. Each such film strip will be identified with the film reel number from which it was taken.

e. The basic procedure for conversion of engineering data to aperture card mounted microfilm is as follows:

- (1) Preparing Drawings for Microfilming (Input Section)

(a) Remove enough drawings from file to complete a roll of film (570 exposures per roll of film or 114 drawings total at 5 exposures per drawing).

(b) Segregate drawings according to security classification and size (for reduction ratio). Drawing sizes A through C will be filmed at 16:1 reduction ratio; size D will be filmed at 24:1 reduction ratio; and all others will be filmed at 30:1 reduction ratio.

(c) Examine drawings for satisfactory microfilming traits. If unsatisfactory, return for redrawing or subsequent manual filing.

(d) Prepare log sheets for block of drawings to be microfilmed. Enter on log sheets the information required by MIL-STD-804, Formats and Coding of Tabulating and Aperture Cards for Engineering Data Micro-Reproduction Systems.

(2) Microfilming Procedures (Microphotography Section)

(a) Adjust camera to proper reduction ratio.

(b) Place proper reduction target in center of photographic field with camera number, roll number, and coding information arranged beneath.

(c) Shoot five exposures of target and remove.

(d) Select drawing, check against log sheet, and place in center of photographic field.

(e) Shoot five exposures of each drawing or number of exposures indicated on log sheet.

(f) Sign each log sheet when block of drawings is completed.

(g) Route drawings back to Input Section where they will be placed in a holding file.

(h) Place camera film in shipping container and route film and two copies of log sheets to film processor.

(3) Film Processing (Microphotography Section)

(a) Upon receiving exposed microfilm and log sheets, the items received will be entered in the Master Log Record for Microfilm Processing.

(b) The original copies of the log sheets will be routed to the EAM Section.

(c) The film and carbon copies of the log sheets will be routed to the film processing area where the film will be processed in accordance with MIL-M-9868A.

(4) Film Inspection (Microphotography Section)

(a) Hypo-Residual Test. Film submitted for acceptance shall have a residual hypo content of less than that specified by FED-STD-125. Specimens for this test shall be taken in accordance with Federal Standard 125.

(b) Failure of Hypo Test. Film which fails to meet the specified residual hypo-content test shall be rewashed and retested until the residual hypo content is less than the allowed content. This film will be rechecked for scratches, creases, and the like. Any print damaged will be rephotographed.

(c) Roll Microfilm Inspection. Each roll of film will be inspected after processing. Imperfect frames caused by underexposure, overexposure, wrong placement, illegible data, or camera malfunction shall be rejected. A Grade III inspection in accordance with paragraph 2a, TM 12-257, will be adhered to.

(d) Rejection of Frames of Microfilm. Each rejected frame of microfilm shall be defaced by punching a cleanly defined 1/4-inch hole through the film image without defacing the drawing number or breaking the edge of the film. Rejected and defaced frames will be deleted from the log sheets and listed so that they may be refilmed.

(e) Resolution Test. Each roll of microfilm shall pass the resolution requirements of MIL-M-9868. Failure to pass the resolution test shall cause rejection of the entire roll.

(f) Density. The background density of the microfilm shall meet the requirements of MIL-M-9868 when tested as specified therein. Frames rejected by this test shall be defaced as specified therein.

(g) A listing of rejected drawings shall be routed to the Input Section as soon as each roll of film is inspected.

(h) Route accepted film to mounting area.

(i) Route carbon copies of log sheets to EAM Section.

(5) Card Coding and Indexing (EAM Section)

- (a) Key punch a non-aperture master deck from original log sheets.
- (b) Correlate original log sheets with carbon copies of log sheets received from Film Inspection Unit and remove non-aperture master card for deleted drawings and destroy.
- (c) Reproduce-punch five aperture decks (or number of decks indicated on log sheets) from the master non-aperture deck.
- (d) Merge-collate the master decks into one so that the number of cards for each drawing will be consecutive.
- (e) Prepare a check listing on IBM Accounting Machine, Type 407, for later checking against drawings.
- (f) Interpret and end print all aperture decks.
- (g) Route decks with aperture cards in consecutive order and log sheets to mounting area.

(6) Mounting (Microphotography Section)

- (a) Upon return of processed and inspected film, check film on viewer against log sheets to ensure proper sequence of microfilm.
- (b) Upon receipt of processed aperture cards, check cards against log sheets to ensure proper sequence of aperture cards.
- (c) Position aperture cards to left side of machine and mount corresponding roll of microfilm on right side of machine.
- (d) Advance film so that first drawing is in viewing screen.
- (e) Check drawing number on aperture card against microfilm frame.
- (f) Remove protective tissue from aperture.
- (g) Adjust controls on mouter until target lines merge.
- (h) Actuate mounting mechanism to secure film to card.
- (i) Remove finished card and repeat operations.
- (j) After all microfilm images are mounted, route completed aperture cards to EAM Section.

(7) Sorting (EAM Section)

(a) After mounting, five or more drawing decks will have been merged in consecutive order into one deck.

(b) Sort decks down into single image decks using IBM Sorter, Type 082.

(c) Sort each deck into numerical drawing sequence.

(d) Place each deck by distribution code into Tabtray shipping container with same distribution code. Adjust follow blocks to compress cards to prevent damage during shipment and fasten on Tabtray Cover.

(e) Distribute diazo aperture decks in accordance with S.O.P. Each installation receiving an automatic distribution for end items type classified Standard-A will be assigned a distribution code that will be entered in column 78-79 of the aperture cards.

(f) Column 80 of the master aperture cards will be used for the deck code for master decks. The following numbers could be used to designate the particular master deck each card belongs to in accordance with the following table:

- "1" Master non-aperture deck - Engineering Documentation Branch
- "2" Master aperture deck - Design activity
- "3" Working aperture deck - Design activity
- "4" Security aperture deck - As designated
- "5" Working aperture deck - Engineering Documentation Branch
- "6" Reference aperture deck - Engineering Documentation Branch

11. Operation of Agency-Wide EDMS

a. Exhibit IV illustrates the general procedure for Agency-wide EDMS workflow.

b. Each Design Activity will make arrangements to send engineering documents to the CBR Agency Engineering Documentation Branch. Standard Operating Procedures will be written to govern the flow of engineering documents between the Design Activity and the Engineering Documentation Branch.

c. All engineering documents entering the EDMS will be entered on a code sheet. This sheet governs camera and EAM operations as to

sequence of documents filmed, number of exposures, and data to be entered in the aperture cards. After the documents are microfilmed, the film will be processed and mounted in master aperture cards according to requirements of current DOD specifications and standards.

d. After film mounting, the required number of aperture card distribution decks will be made by card-to-card printing with a diazo duplication method. Diazo aperture cards will be used for distribution to those activities required to maintain working files of engineering data. Master aperture cards containing original camera film will be distributed to the Design Activities, the security file, and the Engineering Documentation Branch.

e. At the Engineering Documentation Branch, complete master decks will be maintained of all engineering data entered into the EDMS. New cards at stated intervals will be machine merged into existing files using a Modified 087 Collator. At points-of-use in engineering segments, the cards will be manually interfiled.

f. Columns 54 to 76, reserved for the aperture image on aperture cards, will be used to keypunch nomenclature and "used on" information in the non-aperture card. This information will be repeat printed from the non-aperture card onto the third line of the aperture card by a repetitive printing device installed on a Number 557 Interpreter. This additional information on the aperture card will enable receiving engineering segments to file cards by nomenclature, end item, or numerical sequence. The non-aperture cards will be used to make tabulated listings of drawings for distribution and to make up complete drawing or component lists.

g. To provide immediate service for engineering reference and single-copy reproduction requirements, microfilm readers and/or reader-printers will be strategically located throughout the Agency as outlined in paragraph 6a. Agency engineering activities will take care of their own requirements for reference or single copies of engineering data. The Engineering Documentation Branch will furnish reproducible vellum or duplimat masters for volume reproduction.

ESTIMATED COST OF REPRODUCTION WORK PER COPY

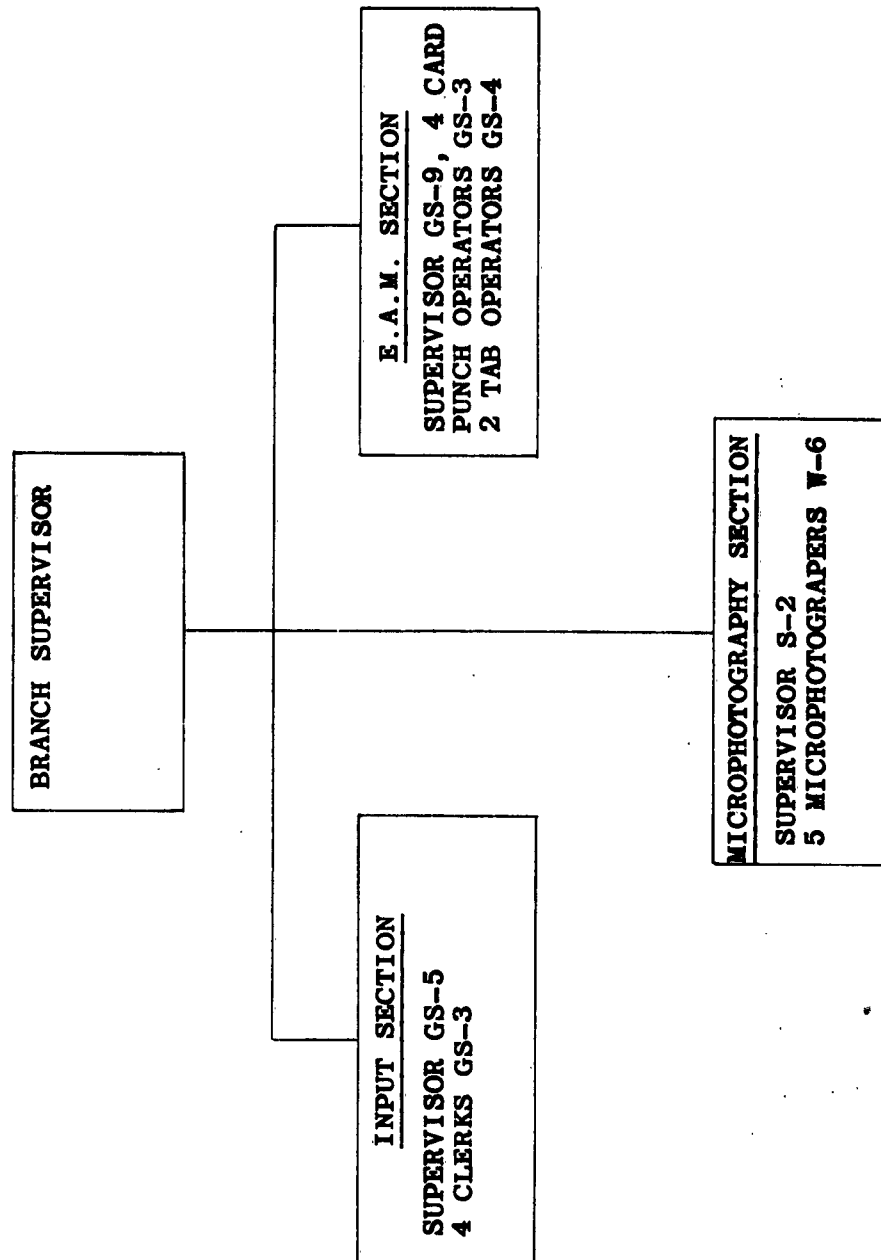
| PRESENT REPRODUCTION SYSTEM, Type of copy | | | | | | |
|---|---------------------------|--------------------------|-----------------|-----------|-----------|--------------------|
| SHEET SIZE | WHITE PRINT (DIAZO) | SEPIA LINE (DIAZO) | FILM (DIAZO) | PHOTOSTAT | THERMOFAX | XEROX "914" COPIER |
| | | | | | | SHEET SIZE COPY |
| A (8-1/2 x 11) | .04 | .08 | .24 | .27 | .06 | 8 x 10-1/2 .11 |
| B (11 x 17) | .06 | .13 | .45 | .54 | | 8-1/2 x 11 .12 |
| C (17 x 22) | .08 | .20 | .82 | 1.09 | | 8-1/2 x 14 .15 |
| D (22 x 34) | .13 | .31 | 1.55 | | | |
| E (34 x 44) | .25 | .63 | 3.12 | | | |

ENGR 55

| MICROFILM REPRODUCTION SYSTEM, Type of copy | | | | | | |
|---|---------------|-------|--------------------|----------------------|------|------------------|
| SHEET SIZE | APERTURE CARD | | READER- PRINTER | XEROX "1824" PRINTER | | |
| | MASTER | DIAZO | | SHEET SIZE | BOND | VELLUM DUPLICATS |
| A (8-1/2 x 11) | .16 | .08 | .18 | 8-1/2 x 11 | .08 | .11 .10 |
| B (11 x 17) | .16 | .08 | .18 | 12 x 18 | .09 | .12 .16 |
| C (17 x 22) | .16 | .08 | .35 | 18 x 24 | .10 | .15 .25 |
| D (22 x 34) | .16 | .08 | .35 | 18 x 24 | .10 | .15 .25 |
| E (34 x 44) | .16 | .08 | .35 | 18 x 24 | .10 | .15 .25 |

EXHIBIT I

U. S. ARMY
C. B. R. AGENCY
ENGINEERING DOCUMENTATION BRANCH
ORGANIZATION CHART



ENGR 55

EXHIBIT II

23



EXHIBIT III

USA CBR AGENCY EDMS

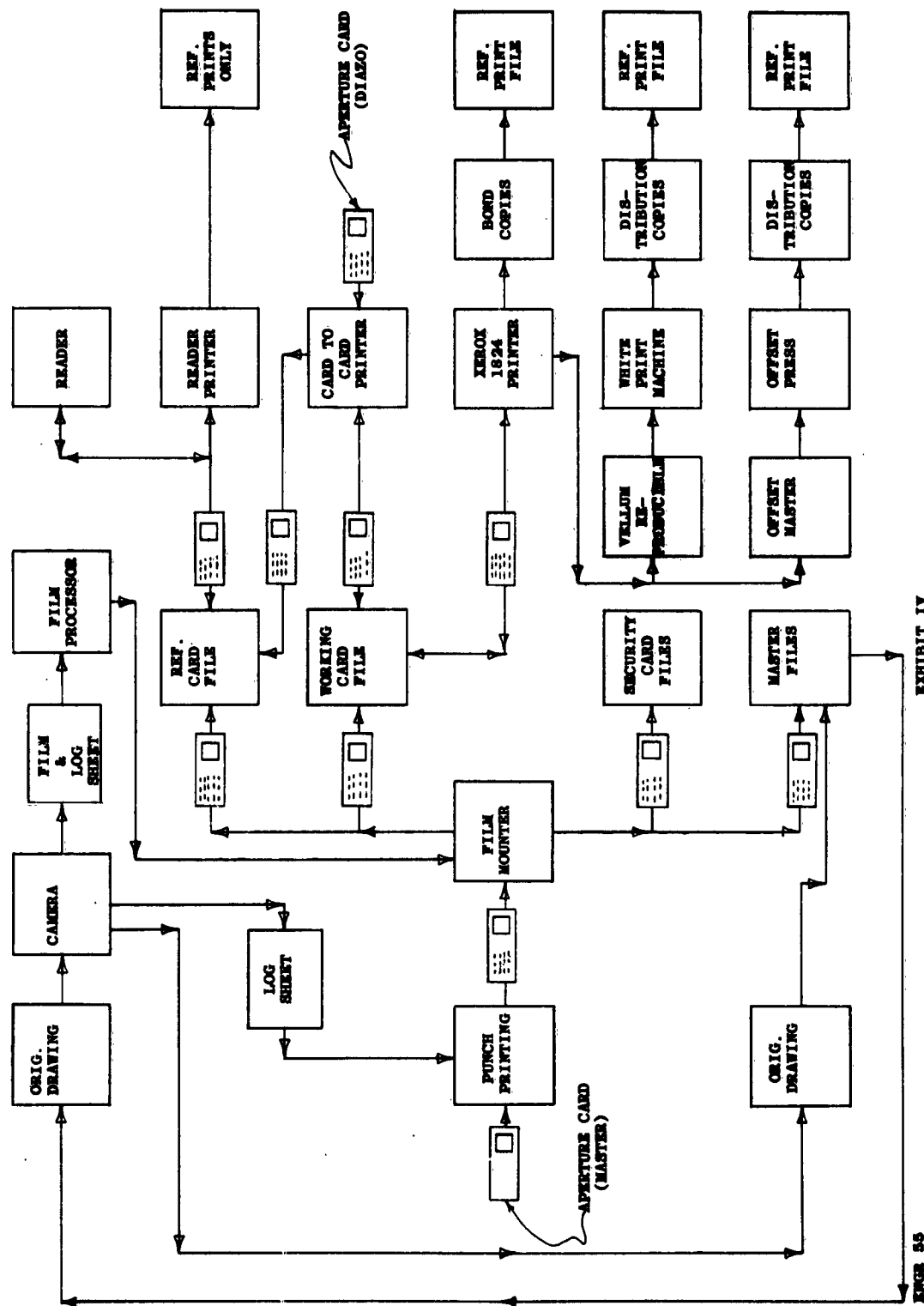


EXHIBIT IV

EXHIBIT IV

Picatinny Arsenal

11 September 1962

APERTURE CARD COST CHART

| | | Cost Per Card | <u>\$.161</u> |
|----------------|---|---------------|----------------|
| <u>COST</u> | <u>ITEM</u> | | |
| \$41.90 | <u>Direct Labor</u> | | |
| | Preparing and Logging Documents (Input) | \$11.76 | |
| | Microfilming | 4.94 | |
| | Film Processing | 2.47 | |
| | Film Inspection | 2.47 | |
| | Film Mounting | 4.94 | |
| | Card Punching | 7.64 | |
| | Card Verifying | 6.68 | |
| | Card Processing | 1.00 | |
| 17.56 | <u>Indirect Labor (Supervision)</u> | | |
| | Clerical (Input) | \$ 4.82 | |
| | Microphotography | 5.92 | |
| | E.A.M. (IBM) | 6.82 | |
| 15.96 | <u>Aperture Card Stock</u> | | |
| 4.66 | <u>Cost of Film</u> | | |
| .15 | <u>Chemicals (Film Processor)</u> | | |
| 5.35 | <u>Camera Rental</u> | | |
| 5.39 | <u>IBM Equipment Rental</u> | | |
| | Card Punch and Verifier | \$ 3.49 | |
| | Other IBM Equipment | 1.90 | |
| .65 | <u>Depreciation</u> | | |
| | Semi-Automatic Mounter | \$.41 | |
| | Densitometer | .04 | |
| | Film Processor | .20 | |
| <u>\$91.62</u> | <u>TOTAL COSTS PER 570 CARDS (ROLL OF FILM)</u> | | |

COST PER APERTURE CARD

* \$91.62 Cost per 570 Aperture Cards
 + 570 Aperture Card
 .16 Per Aperture Card

* All costs based upon 114 documents per roll of film at five shots each for a total of 570 frames.

Picatinny Arsenal
Aperture Card Cost Chart
BACK-UP DATA

1. Direct Labor - \$41.90

a. Preparing and Logging Documents (Clerk, GS-3/4)

6 hours x \$1.96 = \$11.76

b. Microfilming (Microphotographer, W-6/3)

2 hours x \$2.47 = \$4.94

c. Film Processing (Microphotographer, W-6/3)

1 hour x \$2.47 = \$2.47

d. Film Inspection (Microphotographer, W-6/3)

1 hour x \$2.47 = \$2.47

e. Film Mounting (Microphotographer, W-6/3)

2 hours x \$2.47 = \$2.47

f. Card Punching (Card Punch Operator, GS-3/3)

4 hours x \$1.91 = \$7.64

g. Card Verifying (Card Punch Operator, GS-3/3)

3-1/2 hours x \$1.91 = \$6.68

h. Card Processing (Tab Operator, GS-4/2)

1/2 hour x \$1.99 = \$1.00

2. Indirect Labor - \$17.56

a. One Input Supervisor (GS-5/4)

2 hours @ \$2.41 = \$4.82

b. One Microphotography Supervisor (S-2/4)

2 hours @ \$2.96 = \$5.92

BACK-UP DATA CONT'D

c. One EAM Supervisor (GS-9/5)

2 hours @ \$3.41 = \$6.82

3. Aperture Card Stock - \$15.96

570 Aperture Cards @ \$.028

4. Film Costs (1 roll) - \$4.66

One Roll @ \$4.66

5. Processor Chemicals - \$.15

a. Buffer Sponge \$.02

b. Photo - Flo .01

c. Sodium Carbonate .01

d. Developer .056

e. Fixer \$.035

f. Hypo - Clearing .01

g. Starter Solution .01

6. Camera Rental - \$5.35

\$5566.00 Yearly Rental + 260 days = \$21.41

\$21.41 Daily Rental + 1/4 day (2 hours) = \$5.35

7. IBM Equipment Rental - \$5.39a. Key punch and Verifier

\$90.00 Monthly Rental + 22 days = \$4.09

\$4.09 Daily Rental + $\frac{15}{16}$ day (7-1/2 hours) = \$3.49b. Reproducer Collator and Interpreter

\$665.00 Monthly Rental + 22 days = \$30.43

\$30.43 Daily Rental + $\frac{1}{16}$ day (1/2 hours) = \$1.908. Depreciation - \$.65a. Semi-Automatic Mounter

\$4275.00 Cost + 10 Years = \$428.00

\$428.00 Annual Depreciation + 260 days = \$1.64

\$1.64 Daily Depreciation + 1/4 day (2 hours) = \$.41

b. Densitometer

\$800.00 Cost + 10 Years = \$80.00

\$80.00 Annual Depreciation + 260 days = \$.31

\$.31 Daily Depreciation + $\frac{1}{8}$ day (1 hour) = \$.04

c. Film Processor

\$4160.00 Cost + 10 Years = \$416.00

\$416.00 Annual Depreciation + 260 days = \$1.60

\$1.60 Daily Depreciation + $\frac{1}{8}$ day (1 hour) = \$.20

Picatinny Arsenal
DIAZO CARD COST CHART

12 September 1962

Cost Per Card \$.083

| <u>COST</u> | <u>ITEM (Per 100 cards)</u> | |
|---------------|-------------------------------------|--------|
| \$3.54 | <u>Direct Labor</u> | |
| | Card Reproducing (IBM) | \$.50 |
| | Diazo Card Printing | 2.43 |
| | Diazo Card Inspection | .61 |
| 1.02 | <u>Indirect Labor</u> | |
| | EAM (IBM) Supervisor | .28 |
| | Printing and Inspection Supervision | .74 |
| 3.10 | <u>Diazo Card (Duplicard) Stock</u> | |
| .49 | <u>IBM Equipment Rental</u> | |
| .10 | <u>#086 Printer Depreciation</u> | |
| .04 | <u>#086 Printer Activator</u> | |
| <u>\$8.29</u> | <u>TOTAL COSTS PER 100 CARDS</u> | |

COST PER DIAZO CARD

* \$8.29 Cost per 100 cards
 + 100 Cards
\$.083 Per Diazo card

* All costs based upon using an #086 Filmsort Copier (Printer) using 100 silver aperture cards and 100 duplicards.

Picatinny Arsenal

Diazo Cards

Cost Data (Per 100 Cards)

1. Direct Labor - \$3.54

a. EAM Processing (Tab Operator, GS-4/2)

\$1.99 per hour + 15 minutes = \$.50

b. Diazo Card Printing (Microphotographer W-6/3)

\$2.43 per hour X 1 hour = \$2.43

c. Diazo Card Inspection (Microphotographer W-6/3)

Every third card is inspected

\$2.43 per hour + 15 minutes = \$.61

2. Indirect Labor - \$1.02

a. EAM Supervision (GS-9/5)

\$3.41 per hour + 1/12 hour (5 minutes) = \$.28

b. Printing and Inspection Supervision (S-2/4)

\$2.96 per hour + 1/4 hour (15 minutes) = \$.74

3. Diazo Card Stock - \$3.10

100 cards @ \$.031 = \$3.10

4. IBM Equipment Rental - \$.49

#519 Reproducer rents at \$128.00 per/mo. and the #557 Interpretor
rents at \$203.00. Total rental is then \$331.00 per month.

\$331.00 Equip. Rental + 21 days = \$15.76

\$15.76 Daily Rental + 15 Minutes = \$.49

5. #086 Printer Depreciation - \$.10

$\$1000.00 \text{ Cost} + 5 \text{ Yrs. Life} = \200.00

$\$200.00 \text{ Annual Deprec.} + 260 \text{ Days} = \$.78$

$\$.78 \text{ Daily Deprec.} + 1 \text{ Hr.} = \$.10$

6. #086 Printer Developer

One Quart Developer @ \$.80

2000 Cards to One Quart

$\$.80 + 2000 = \$.0004 \text{ per card}$

$\$.0004 \text{ per card} \times 100 \text{ cards} = \$.04 \text{ per/C}$

ENGINEERING DOCUMENTATION BRANCH

XEROX 1824 PRINTER COPY COST CHART

11 Sep 1962

The figures shown below represent actual cost per copy from the Xerox 1824 Printer Machine based upon a monthly production of 14,000 copies per machine. Costs of supplies and drum usage per copy have been supplied by the Xerox Company. All other statistics have been provided by Picatinny Arsenal.

BOND (NON-REPRODUCIBLE) COPIES

| | 8-1/2x11 | 12x18 | 18x24 |
|-----------------------|--------------------------|--------------------------|--------------------------|
| Machine Rental | <u>\$.02893*</u> | <u>\$.02893*</u> | <u>\$.02893*</u> |
| Supplies & Drum Usage | .01931 | .02444 | .03324 |
| Paper Stock | .00430 | .00650 | .01300 |
| Labor | .02766** | .02766** | .02766** |
| Cost Per Copy | <u>.08020(\$.08 ea)</u> | <u>.08753(\$.09 ea)</u> | <u>.10283(\$.10 ea)</u> |

VELLUM (REPRODUCIBLE) COPIES

| | 8-1/2x11 | 12x18 | 18x24 |
|-----------------------|--|--------------------------|--|
| Machine Rental | <u>\$.02893*</u> | <u>\$.02893*</u> | <u>\$.02893*</u> |
| Supplies & Drum Usage | .01931 | .02444 | .03324 |
| Paper Stock | .03000 | .04000 | .06500 |
| Labor | .02766** | .02766** | .02766** |
| Cost Per Copy | <u>.10590(\$.10$\frac{1}{2}$ ea)</u> | <u>.12103(\$.12 ea)</u> | <u>.15483(\$.15$\frac{1}{2}$ ea)</u> |

DUPLIMATS (FOR OFFSET PRESS)

| | 8-1/2x11 | 12x18 | 18x24 |
|-----------------------|--------------------------|--------------------------|--------------------------|
| Machine Rental | <u>\$.02893*</u> | <u>\$.02893*</u> | <u>\$.02893*</u> |
| Supplies & Drum Usage | .01931 | .02444 | .03324 |
| Mat Stock | .02500 | .08000 | .16000 |
| Labor | .02766** | .02766** | .02766** |
| Cost Per Copy | <u>.10090(\$.10 ea)</u> | <u>.16103(\$.16 ea)</u> | <u>.24983(\$.25 ea)</u> |

*Based upon a monthly production of 14,000 each machine (\$.0825 for 1st 2000 copies, \$.02 for next 12,000 copies)

**Based upon a daily production of 700 copies per 8 hr. day and an operator's salary of \$2.43 per hour.

TYPES OF PAPER USED

- (1) Bond Sulphite Bond, 24 lb substance, all sizes, obtained from any paper company.
- (2) Vellum Vellum, Clearprint No. 1020 (Ogilvie Press Co.) or Post Blue-Tex No. 175 H.
- (3) Duplimats
 - a. 8-1/2x11 Series 3000, slotted edge, No. 7-3050-5, Addressograph-Multigraph Co.
 - b. 11x17 Series 3000, slotted edge, No. 7-3920-5, Addressograph-Multigraph Co.
 - c. 18x24 Catalog No. 66-296, slotted edge, Columbia Ribbon & Carbon Co. (Colitho)

| | | | | | |
|---|--|---|--|---------------------------|-------------------|
| DEPARTMENT OF THE ARMY JOB DESCRIPTION <small>(Sec. 3, CPPM I and CPR P2)</small> | | 1. INSTALLATION OR HEADQUARTERS OFFICE Picatinny Arsenal, Dover, New Jersey | | 2. JOB NO. 7824 | |
| 3. CITATION TO APPLICABLE STANDARD AND ITS DATE OF ISSUANCE | | | 4. TITLE MICROPHOTOGRAPHY WORKER | | |
| 5. PAY CATEGORY WB | | 6. OCC. CODE 4430 | | 7. GRADE 06 | |
| 8. EVALUATION APPROVAL Grade and title of this job have been fixed in accordance with Department of the Army official policy and grade level standards. | | | | | |
| FOR THE COMMANDER: <u>G. L. GOLDSWORTHY</u> <u>24 July 1958</u> Salary and Grade <u>Rate</u> <u>Officer</u> (MDC) | | | | | |
| 9. JOB CONTROLS, DUTIES, AND WORKING CONDITIONS <i>(Indicate percent of time for each duty, where pertinent) (Continuous statement of duties, etc., on reverse side if necessary)</i> | | | | | |
| JOB SUMMARY | | | | | |
| 1. RESPONSIBILITY: The operation of microfilm cameras and readers in the microfilming of all Research and Development Drawings, Gage Drawings and Lists and Technical Reference Drawings; the inspecting of processed 35 mm film to insure compliance with Arsenal and Bureau of Standards Specifications; the mounting of film into coded Drawing Record Aperture Cards; the producing of enlargements from microfilm and the duplicating or printing of microfilm by the diazo process. | | | | | |
| JOB CONTROLS | | | | | |
| 2. SUPERVISORY: Supervisor provides outline of work to be performed with occasional instructions relative to the photographic quality of poor copy and special jobs, permitting independence of action in the performance of duties. Completed work is spot checked for overall quality and compliance with reproduction requirements. | | | | | |
| 3. REGULATORY: Manufacturer's manuals, security regulations, Arsenal administrative regulations, safety regulations, applicable Arsenal Standing Operating Procedures and other similar official publications. | | | | | |
| 4. OTHER: None. | | | | | |
| MAJOR DUTIES | | | | | |
| 5. Operates automatic microfilm cameras and readers in microfilming bound and unbound engineering drawings and related engineering type data of various sizes; organizes work as to size, condition, density of print, etc.; aligns material on cradle of equipment and makes necessary operating adjustments such as positioning camera, varying position and intensity of lights and determining proper exposure; exposes frame. Makes required checks of equipment during operation to insure proper | | | | | |
| 10. CERTIFICATION <i>(Complete on organization file copy only)</i> | | | | | |
| ORGANIZATION LOCATION Administrative Services Office - Records and Mail Services Branch | | | | | |
| I HEREBY CERTIFY THAT THIS STATEMENT ACCURATELY DESCRIBES THE JOB CONTROLS AND MAJOR DUTIES WHICH I FOUND TO EXIST IN THIS ORGANIZATION SEGMENT FOR THE JOB. | | | I HEREBY CERTIFY THAT THIS STATEMENT DESCRIBES THE WORK REQUIRED IN ONE POSITION OR IN EACH OF A GROUP OF POSITIONS IN THE ABOVE ORGANIZATION. | | |
| SIGNATURE OF ANALYST | | | SIGNATURE OF APPROVING SUPERVISOR | | |
| 11. REAUDIT CERTIFICATION | | | | | |
| DATE | | | | | DO NOT USE |
| SUPERVISOR'S APPROVAL | | | | | |
| ANALYST'S APPROVAL | | | | | |

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Inclosure 4

functioning. Loads and unloads cameras; cleans lenses, replaces burned out lights, oils, etc.

6. Examines processed 35 mm film as to established specifications; retakes sub-standard film. Checks sequence on Microfilming Drawing Log Sheets against film roll number and frame indicator and coded Drawing Record Cards; mounts film into aperture cards using 35 mm modified mouter; forwards completed cards to machine records activity.
7. Selects proper frame number and produces enlargements from microfilm; exposes sensitized contact paper, develops, fixes, washes and dries exposed material; mixes chemical solutions required for processing enlargements.
8. Operates diazo process machine to produce prints or translucent paper reproducibles on diazo process standard printing materials; judges exposure required; checks thermostat prior to operation to insure sufficient heat; sets speed of machine; checks prints in process and varies timing and ammonia flow as required to produce prints of proper contrast; cuts prints to size. Loads machine; replaces ammonia supply, electronic tubes, filter, belts; cleans rollers, etc.

Performs other duties as assigned.

RELATED FACTORS

9. PHYSICAL DEMAND: Work involves sitting or standing for periods of time in the performance of continuous duties.
10. WORKING CONDITIONS: Work is performed in adequately lighted and ventilated shop; however, incumbents are subject to possible eye discomfort from glaring illumination and there is some danger of skin burns or infection from ammonia or handling chemicals. Odor of ammonia is present.

| | | | | | |
|---|--|---|--|----------------------------|----------------------|
| DEPARTMENT OF THE ARMY JOB DESCRIPTION <small>(Sec. 5, CPPM I and CPR P2)</small> | | 1. INSTALLATION OR HEADQUARTERS OFFICE Picatinny Arsenal, Dover, New Jersey | | 2. JOB NO. 10778 | |
| 3. CITATION TO APPLICABLE STANDARD AND ITS DATE OF ISSUANCE | | | 4. TITLE EAM OPERATOR | | |
| | | | 5. PAY CATEGORY GS | 6. OOL CODE 359 | 7. GRADE 3 |
| 8. EVALUATION APPROVAL FOR THE COMMANDER: Grade and title of this job have been fixed in accordance with Department of the Army official policy and grade level standards. | | | | | |
| D. D. CAMPBELL Salary and Wage Officer 15 June 1961 <small>(Date)</small> | | | | | |
| 9. JOB CONTROLS, DUTIES, AND WORKING CONDITIONS <small>(Indicate percent of time for each duty, where pertinent) (Continue statement of duties, etc., on reverse side if necessary)</small> | | | | | |
| JOB SUMMARY | | | | | |
| 1. RESPONSIBILITY: Performs machine operation work and related clerical work involved in processing data by means of electric accounting machines. | | | | | |
| JOB CONTROLS | | | | | |
| 2. SUPERVISORY: Machine work is done on the basis of specific and pre-planned written or oral instructions related to the particular assigned project. Supervisor provides initial assignments and solves typical problems. | | | | | |
| MAJOR DUTIES | | | | | |
| 3. Operates the following EAM machines to accomplish the indicated processes: (a) Card Punch to prepare program cards and punch cards, (b) Verifier to verify punch cards, (c) Collator to collate cards, sequence check, card count, select duplicate card sets, matching, (d) Reproducer to endprint, reproduce, interspersed gangpunch, gangpunch, reproducing and gang-punching, (e) Interpreter to interpret, (f) Sorter to sort and arrange cards in numerical or alphabetical sequence, card count, (g) Accounting Machine to prepare listings, count cards for control purposes, and make selective listings. | | | | | |
| 4. Performs such EAM related clerical work as: (a) manual filing and withdrawing cards, (b) comparing data on cards with information on source documents. | | | | | |
| Performs other duties as assigned. | | | | | |
| 10. CERTIFICATION <small>(Complete on organization file copy only)</small> | | | | | |
| ORGANIZATION LOCATION Staff Div., ASO, Micro Data Processing Branch, E.A.M. Section | | | | | |
| I HEREBY CERTIFY THAT THIS STATEMENT ACCURATELY DESCRIBES THE JOB CONTROLS AND MAJOR DUTIES WHICH I FOUND TO EXIST IN THIS ORGANIZATION SEGMENT FOR THE JOB. | | | I HEREBY CERTIFY THAT THIS STATEMENT DESCRIBES THE WORK REQUIRED IN ONE POSITION OR IN EACH OF A GROUP OF POSITIONS IN THE ABOVE ORGANIZATION. | | |
| SIGNATURE OF ANALYST | | | SIGNATURE OF APPROVING SUPERVISOR | | |
| 11. REAUDIT CERTIFICATION | | | | | |
| DATE | | | | | DO NOT USE |
| SUPERVISOR'S APPROVAL | | | | | |
| ANALYST'S APPROVAL | | | | | |
| | | | | | |

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1 SEP 62

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